IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION

NATIONAL INSTITUTE FOR STRATEGIC TECHNOLOGY ACQUISITION (NISTAC), Plaintiff v. NISSAN NORTH AMERICA, INC. et al., Defendants.	Case No. 11-cv-11039-GCS-LJM **Hon. George Caram Steeh** **Magistrate Judge Laurie Michelson** JURY DEMANDED
AND RELATED COUNTERCLAIMS	

DEFENDANTS' INITIAL CLAIM CONSTRUCTION BRIEF

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Defendants Nissan North America, Inc., Nissan Motor Co., Ltd., Fuji Heavy Industries Ltd., Subaru of America, Inc., American Honda Motor Co., Inc., Toyota Motor Sales, U.S.A. Inc., and Toyota Motor Engineering & Manufacturing North America, Inc. (collectively, "Defendants") submit this brief pursuant to ¶ G.4 of the Court's May 23, 2011 Rule 26(f) Report and Discovery and Scheduling Order (D.I. 23) regarding the construction of certain terms of U.S. Patent Nos. 5,239,955 ("the '955 patent"), 5,313,919 ("the '919 patent"), and 5,482,637 ("the '637 patent") (collectively, "the patents-in-suit").

I. INTRODUCTION

Defendants' proposed constructions reflect what a person of ordinary skill in the art would understand as the meaning of the claim terms in the context of the patents-in-suit. In contrast to the constructions proposed by NISTAC, Defendants' proposed constructions are clear, unambiguous, and free of unnecessary technical jargon. Most importantly, Defendants' proposed constructions are supported by the intrinsic evidence and, where appropriate, consistent extrinsic evidence.

The '955 and '919 patents[1] relate to a specific piston construction that is designed to reduce friction. (*E.g.*, Ex. A, '955 patent at [54] (title), [57] (abstract).) The claims of these patents require a specific type of piston skirt that includes "lands," defined by and surrounding "relieved" portions, with a "predetermined pattern" of "asperities" and a "solid film lubricant coating" that may include "grooves." (*E.g.*, *id.* claims 1–23; Ex. B, '919 patent claims 1–13.) The "relieved" portions constitute "reservoirs of oil" that store oil to replenish an oil film. Reciprocating movement of the claimed piston must result in the transfer of some of the "solid

[1] The '919 patent is a divisional of the '955 patent. (Ex. B, '919 patent at [62] (related U.S. application data).) As such, they share a common specification and figures. Unless specifically noted otherwise, Defendants will cite to the '955 patent's specification for the identical propositions present in both specifications.

lubricant coating" to the cylinder bore wall, and the "transferred coating" on the cylinder bore wall must contain "microasperities." (*E.g.*, Ex. A, '955 patent claims 1–23; Ex. B, '919 patent claims 1–13.)

The '637 patent relates to a specific composition for forming a solid film lubricant coating. (*E.g.*, Ex. C, '637 patent at [54] (title), [57] (abstract).) The coating composition of the '637 patent must be "depositable," it must contain a mixture of "solid lubricant crystals," a "resin," and a "catalyst," and the mixture must be carried by an "evaporative medium." (*E.g.*, *id.* claims 1–20.)

II. LEGAL STANDARD FOR CLAIM CONSTRUCTION

The claims of a patent "provide substantial guidance as to the meaning of particular claim terms." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005) (en banc); *see Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1324 (Fed. Cir. 2002) (indicating that the patent claims themselves are the proper starting point for claim construction). Claim terms normally carry their ordinary and customary meaning, *Teleflex*, 299 F.3d at 1325, and the proper inquiry in claim construction is how a person of ordinary skill in the art, in the context of the entire patent, would understand the words used in the asserted claims. *Phillips*, 415 F.3d at 1313. Where the meaning of a claim term as understood by those of skill in the art is not immediately apparent to laypersons, the Court looks to "those sources available to the public that show what a person of skill in the art would have understood [the] claim language to mean . . . ." *Id.* at 1314. "Those sources include the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art." *Id.* (internal quote omitted).

The Court first looks to how the disputed term is used in the claims. "[T]he context in which a term is used in the asserted claim can be highly instructive." *Id.* at 1314. Additionally,

"[o]ther claims of the patent in question, both asserted and unasserted, can also be valuable sources of enlightenment as to the meaning of a claim term." *Id.* Thus, the proper construction of a claim term involves reading the disputed term in the context of the other words and phrases in the claim at issue as well as other claims in the patent.

In addition to the language of the claims themselves, the Court looks to the intrinsic evidence: the specification and the prosecution history of the patents. *Id.* at 1315–17. The claims must be read and construed in light of the specification. *Id.* at 1315. The specification is "always highly relevant to the claim construction analysis" and has been described as "the single best guide to the meaning of a disputed term." *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). In addition to the specification, the Court should also consider the prosecution history of the patents-in-suit because, "[l]ike the specification, the prosecution history provides evidence of how the PTO and the inventor understood the patent." *Phillips*, 415 F.3d at 1317.

Finally, while extrinsic evidence—including technical dictionaries, treatises, and expert and inventor testimony—is afforded less weight than intrinsic evidence, a court may nonetheless use extrinsic evidence for guidance in ascertaining the meaning of claim terms as they would be understood by one of ordinary skill in the art so long as it is considered "in the context of the intrinsic evidence." *Id.* at 1317–19.

III. ARGUMENT

A. The '955 and '919 Patents

1. "relieved" / "unrelieved," "reservoirs of oil," and "lands"

The terms "relieved," "unrelieved," "reservoirs of oil," and "lands" are described in the '955 and '919 patents as essential to meeting the stated objectives of the claimed inventions. Accordingly, construction of these terms is necessary.

Claim Terms	Defendants' Proposed Constructions	NISTAC's Proposed Constructions
"relieved" / "unrelieved"	"cut away" / "not cut away"	No construction necessary.
"reservoirs of oil"	"relieved portions on the piston skirt that retain oil and are surrounded by lands"	No construction necessary.
"lands"	"unrelieved portions of the piston skirt surrounding the relieved portions"	No construction necessary. Alternative: The parts of the piston that are above and below the ring groove

The "relieved" portions of the skirt wall, the "reservoirs of oil," and the "lands" (i.e., the "unrelieved" portions of the skirt wall) are necessary to realize the alleged benefits set forth in the '955 and '919 patents—a piston with an allegedly novel "friction reduction" scheme that is achieved through (i) oil retention and replenishment and (ii) a transferred coating from the piston skirt to the cylinder bore wall.

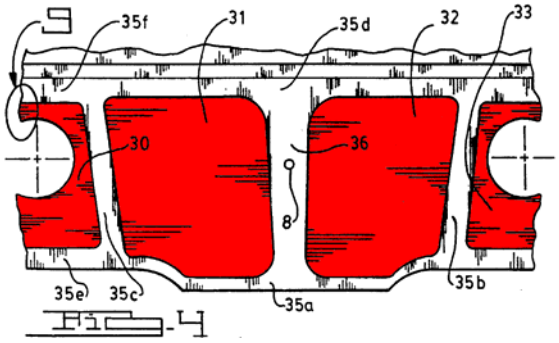
> In this invention, novel friction reduction is achieved substantially . . . by ***definition of oil replenishing reservoirs in the piston skirt wall***. . . . A fuller potential of friction reduction can be realized in a method of using such piston product . . . in a reciprocating assembly where there is further reduction in any mixed lubrication regime as a result of the ***transfer of the SFL to the cylinder bore wall***, ensuring more complete hydrodynamic lubrication regime . . . .

(Ex. A, '955 patent at 7:17–34 (emphasis added).) The terms are best understood together. The "relieved" portions form "reservoirs of oil" critical to attaining the first purported benefit—oil retention and replenishment. (*Id.* at 4:10–12.) Moreover, the "unrelieved" portions of the piston skirt constitute "lands" so as to "reduce the interfacing area of the piston with the bore wall" and attain the second purported benefit—the transfer of coating from the skirt wall to the cylinder bore wall. (*Id.* at 4:10–12.) These claimed features differentiate the piston disclosed in the '955 and '919 patents from the prior art, shown in Figures 1 and 2. The specification teaches that the "relieved" portions of the piston skirt are formed by cutting away material from the surface of the piston skirt to define "lands" that surround "reservoirs" to retain oil during operation of the

piston assembly. Accordingly, and in view of the disclosure in the specification, "relieved" must be construed to mean "cut away" (with "unrelieved" being construed as the opposite, or "not cut away"); "reservoirs of oil" must be construed to mean "relieved portions on the piston skirt that retain oil and are surrounded by lands;" and "lands" must be construed to mean "unrelieved portions of the piston skirt surrounding the relieved portions."

The concept of "undercutting"—or cutting material away—is used consistently throughout the specification to describe how the "relieved" areas of the skirt are formed. (*Id.* at 1:59–64, 2:26–28, 5:30–33, 5:46–48.) In fact, the only methods disclosed in the patents for forming the "relieved" portions are mechanical machining or electrical discharge machining, both of which cut away portions of the skirt wall to form the reservoirs (for oil replenishment) and to define the "lands" (to facilitate coating transfer). (*Id.* claim 10 (requiring the step of "undercutting the exterior of said side walls to define radially exposed lands for sliding along said bore wall"); *id*. at 4:14–17, 5:30–33, 5:46–48.)

As described in the specification, the "reservoirs of oil" retain oil, which is critical to the first alleged benefit described in the patents. Cutting away material from the piston skirt surface—as reflected in the Figures of the patents—is the only way described in the specification to create these oil-retaining "reservoirs." "The object of the undercut portion is to ***retain oil***, particularly during the downstroke of the piston," (*Id.* at 8:7–8 (emphasis added)), and every embodiment of the patents is directed to this object. As noted in the specification, Figure 4 of the '955 and '919 patents "illustrates how the skirt wall is relieved at areas 30, 31, 32, 33 on one side of the piston" (reproduced below with the red areas indicating the "relieved" portions):



(*Id.* Fig. 4 (coloring added).) As shown in this Figure, the "relieved" areas are cut away to create "oil reservoirs" and define the "lands." Figures 5 and 6 depict alternative arrangements of the "lands" and "oil reservoirs." (*Id.* Figs. 5–6.) "The benefit of these alternative embodiments is to ***enhance the size and location of oil reservoirs*** during transient mode operation of the engine, ***such reservoirs being critical to the retention of the oil film*** to promote mixed and hydrodynamic lubrication." (*Id.* at 5:14–19 (emphases added).) The only way described in the patents to create these "critical" reservoirs in the skirt wall is to cut material away.

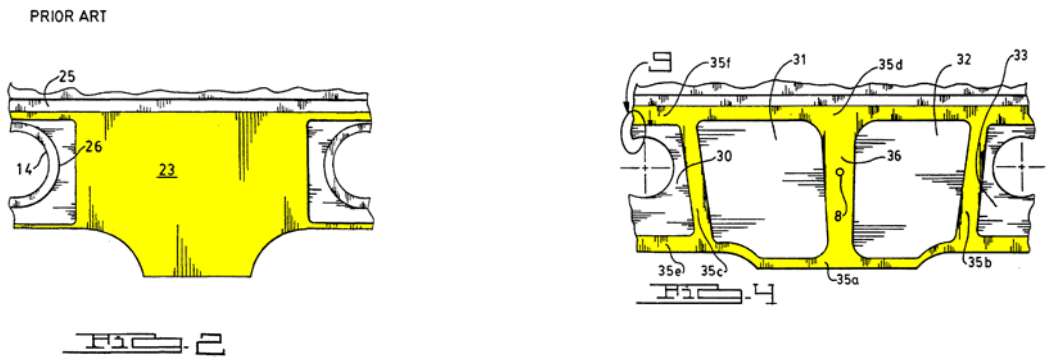
Moreover, cutting material away from the surface of the skirt wall facilitates the second friction-reducing aspect of the alleged invention of the '955 and '919 patents: the transfer of coating from the piston skirt to the cylinder bore wall. As noted in both the specification and the claims, the "unrelieved" portions of the piston skirt (i.e., the "lands") are coated with a solid film lubricant coating. (*Id.* at 4:32–34, 5:35–39; *id.* claims 9, 18.) Cutting material away from the piston skirt surface "reduce[s] the interfacing area of the piston with the bore wall." (*Id.* at 4:9–12). The reduced surface area of the coated "lands" contacts the cylinder bore wall, resulting in an increased loading on the bore wall that facilitates transfer of the coating from the piston skirt to the cylinder bore wall. (*Id.* at 7:35–40, 7:63–65.)

The objective behind creating the "lands" is to reduce the contact surface area of the piston skirt to a ***minimum*** by cutting material away from the skirt surface. (*Id.* at 7:63–65 ("The

area of thrust surfaces is reduced to a minimum so that the SFL impregnated surface is subjected to significantly higher thrust loads."); *id.* claim 19 ("in which the reduced area of said lands imparts increased loading to promote transfer of said solid film lubricant to the cylinder bore wall").) The "lands" are defined by the portions of the piston skirt that are not cut away, because the removal of material leaves "unrelieved" portions. "The unrelieved portion of the skirt wall becomes a land or lands for sliding engagement along the cylinder bore wall." (*Id.* at 4:16–19.)

The claims of the patents likewise recite "lands" with a reduced surface area. Indeed, the claims of both the '955 and '919 patents require the "relieved" (i.e., cut away) areas to "***define*** radially exposed lands." (*Id.* claims 9, 18 (emphasis added); Ex. B, '919 patent claim 2 (emphasis added).) Moreover, claim 19 of the '955 patent refers to "***the reduced area*** of said lands" in claim 18—thus confirming that the claimed "lands" have a reduced surface area vis-à-vis the contact surface area of prior art pistons. (Ex. A, '955 patent claims 18–19 (emphasis added).)

This is consistent with the Figures of the patents, and particularly from a comparison between the broad, flat piston skirts of what the patents identify as a "prior art" piston and the skirt with "lands" and "relieved areas" of the piston disclosed in the '955 and '919 patents:



(*Id.* Figs. 2, 4 (coloring added).) Shown above in yellow are the areas of the piston skirt wall that interface with (i.e., contact) the cylinder bore wall—the prior art piston on the left and the

piston described in the '955 and '919 patents on the right. (*Id.* at 4:9–12.) As depicted above, the surface area contacting the bore wall is greatly reduced on the skirt described in the patents as compared to the prior art skirt. This significant reduction in surface area is accomplished by "undercutting"—or cutting away—portions of the piston skirt surface. Accordingly, the term "relieved" should be construed as "cut away" (and as a corollary, "unrelieved" should be construed as "not cut away").

Construing "lands" to surround the "relieved" portions of the piston skirt wall areas—and, as a corollary, construing "reservoirs of oil" as "surrounded by" the "lands"—is likewise consistent with the specific "friction reduction" concepts described in the patents. By surrounding the relieved areas, the "lands" create "oil replenishing reservoirs in the piston skirt wall," which facilitate the reduction of friction between the piston skirt and the cylinder bore wall. (*Id.* at 7:17–20.) The "critical" purpose of retaining oil confirms the normal understanding of the oil reservoir as having a boundary on all four sides—and the patents teach that the surrounding "lands" form that necessary boundary. It is also consistent with the claim requirement that the oil reservoirs be adjacent the retained oil films (which are on the "lands"). The removal of material from the skirt wall surface defines unrelieved "lands" that surround the relieved portions. Indeed, every embodiment disclosed in the '955 and '919 patents has relieved portions surrounded by "lands." (*Id.* Figs. 4–6.) Accordingly, the term "reservoirs of oil" should be construed as "relieved portions on the piston skirt that retain oil and are surrounded by lands," and the term "lands" should be construed as "unrelieved portions of the piston skirt surrounding the relieved portions."

NISTAC's proposed alternative construction for "lands" is inconsistent with, and completely devoid of any support in, the intrinsic record. The "parts of the piston that are above

and below the ring groove" include literally the ***entire*** piston other than the ring groove. This reading of the term "lands" is nonsensical and contrary to the teachings of the patents themselves. In the first place, the definition would define as "lands" the entire portion of the piston assembly described as the "prior art," shown in Figure 1, essentially all of which is either above or below the ring groove. Moreover, the specification describes and defines the "lands" very specifically to mean the portions of the piston skirt that remain after portions are cut away (i.e., "relieved") so as to reduce the surface area that comes into contact with the cylinder bore wall and surrounds oil reservoirs. NISTAC's failure to identify any supporting intrinsic evidence for its proposal in the Joint Claim Construction Statement speaks volumes. Indeed, there is no intrinsic evidence supporting NISTAC's proposed construction.

2. "solid film lubricant coating," "solid lubricants," "solid film lubricant crystals"

Every independent claim of each of the '955 and '919 patents requires a "solid film lubricant coating." Independent claim 10 of the '955 patent and independent claims 2 and 9 of the '919 patent further require (1) a "solid film lubricant coating" consisting of "solid film lubricant crystals," and (2) a resin providing a ready supply of water or hydrocarbon to the "solid lubricants." Independent claim 18 of the '955 patent requires the "solid film lubricant coating" to consist of "solid lubricants."

Claim Terms	Defendants' Proposed Constructions[2]	NISTAC's Proposed Constructions
"solid film lubricant coating"	Plain and ordinary meaning	"A coating that has lubricating properties and in solid film form with at least two crystals chosen from the group of graphite, boron nitride (BN), and molybdenum disulfide (MoS_2), regardless of the existence of other crystals with lubricating properties"
"solid lubricants"	"two or more solid lubricants" "graphite, molybdenum disulfide, and optionally boron nitride" (*American Honda Motor Co., Inc.*)	No construction necessary Alternative: "lubricants in solid film form with at least two crystals chosen from the group of graphite, boron nitride (BN), and molybdenum disulfide (MoS_2), regardless of the existence of other crystals with lubricating properties"
"solid film lubricant crystals"	"crystals of two or more solid lubricants" "crystals of graphite, molybdenum disulfide, and optionally boron nitride" (*American Honda Motor Co., Inc.*)	"Crystals with lubricating properties and in solid film form with at least two crystals chosen from the group of graphite, boron nitride (BN), and molybdenum disulfide (MoS_2), regardless of the existence of other crystals with lubricating properties"

a. Argument Of All Defendants Except Honda

The claim phrase "solid film lubricant coating" does not require construction because it carries its plain and ordinary meaning. The specification and claims of the '955 and '919 patents are clear that a solid film lubricant coating is a film coating comprised of solid lubricants. (*E.g.*, Ex. A, '955 patent at 2:52–54 (indicating that "a solid film lubricant coating [is present] on said lands, said coating consisting of solid lubricants"); *id.* claim 18 (same).)

The phrase "solid lubricants" is plural, indicating "two or more." *E.g.*, *Leggett & Platt, Inc. v. Hickory Springs Mfg. Co.*, 285 F.3d 1353, 1357 (Fed. Cir. 2002); *Dayco Prods., Inc. v.*

[2] As indicated below, all of the Defendants with the exception of Defendant American Honda Motor Co., Inc. ("Honda") agree to Defendants' proposed constructions. Defendant Honda's proposed construction is indicated separately in the chart.

Total Containment, Inc., 258 F.3d 1317, 1327–28 (Fed. Cir. 2001); *York Prods., Inc. v. Cent. Tractor Farm & Family Ctr.*, 99 F.3d 1568, 1575 (Fed. Cir. 1996). Moreover, the specification of the '955 and '919 patents provides an example of "solid lubricants"—the group of graphite, molybdenum disulfide (MoS_2), and boron nitride (BN). (Ex. A, '955 patent at 4:36–37.) In other words, the specification indicates that "solid lubricants" means "***two or more*** solid lubricants." (*Id.*) Additionally, claim 2 of the '955 patent requires certain percentages of ***three*** solid lubricants—graphite, molybdenum disulfide (MoS_2), and boron nitride (BN)—thus further supporting the position that "solid lubricants" means "two or more solid lubricants." (*Id.* claim 2.) Finally, when the applicants used the singular form "solid lubricant" in the specification, they always did so followed by a plural modifier like "ingredients" or "particles." (*Id.* at 4:37–41, 4:61–64.) In the claims, however, the applicants made exclusive use of the plural phrase "solid lubricants," indicating that they were referring to "two or more solid lubricants."

The claims of the '955 and '919 patents also use the term "solid film lubricant crystals." "Solid film lubricant crystals" modifies the phrase "solid film lubricant coating." (*E.g.*, *id.* claim 10 (claiming "a solid film lubricant coating onto said lands, ***said coating*** consisting of solid film lubricant crystals" (emphasis added)); Ex. B, '919 patent claims 2, 9 (same).) Thus, "solid film lubricant crystals" must mean something different than "solid film lubricant coating." The claim phrase "solid film lubricant crystals" is plural, indicating that it requires multiple crystals. More importantly, as discussed above, "solid lubricants" means "two or more solid lubricants." Thus, the claim phrase "solid film lubricant crystals" should be construed to mean "crystals of two or more solid lubricants."

The proposed constructions offered by NISTAC suffer from several significant defects. Despite the fact that these terms are capable of being construed simply and straightforwardly, NISTAC attempts to supplant these claim phrases—which consist of four words or less—with convoluted constructions that are substantially longer than the claim language itself. Such constructions are neither grounded in the intrinsic evidence nor helpful to a jury in deciding this case. Additionally, NISTAC improperly attempts to introduce several limitations not found in the claims themselves. *See, e.g.*, *Varco, L.P. v. Pason Sys. USA Corp.*, 436 F.3d 1368, 1373 (Fed. Cir. 2006) ("In examining the specification for proper context, however, this court will not at any time import limitations from the specification into the claims.").

First, NISTAC improperly imports the limitation that each of these phrases involves "crystals." In doing so, NISTAC ignores the fact that while ***every*** claim of the '955 and '919 patents requires a "solid film lubricant coating," ***only*** independent claim 10 of the '955 patent and independent claims 2 and 9 of the '919 patent recite any type of "crystals." (Ex. A, '955 patent claim 10; Ex. B, '919 patent claims 2, 9.) Under the doctrine of claim differentiation, different terms in different claims are presumed to have different meanings. *See, e.g.*, *Comark Commc'ns, Inc. v. Harris Corp.*, 156 F.3d 1182, 1187 (Fed. Cir. 1998); *Tandon Corp. v. U.S. Int'l Trade Comm'n*, 831 F.2d 1017, 1023 (Fed. Cir. 1987). The specification and claims of the '955 and '919 patents use two different phrases—"solid film lubricant coating" and "solid film lubricant crystals"—to refer to two different things. Yet NISTAC impermissibly attempts to render them synonymous.

Second, NISTAC's proposed constructions improperly suggest that two crystals of any one solid lubricant could satisfy these claim limitations. As discussed above, the '955 and '919 patents plainly indicate that the phrase "solid lubricants" means "two or more solid lubricants."

Nothing in the patents suggests that two crystals of a single solid lubricant, such as graphite for example, constitute "solid lubricants," let alone a "solid film lubricant coating" or "solid lubricant crystals." Indeed, the specification describes that molybdenum disulfide alone cannot achieve the higher operating temperature object of the invention. (Ex. A, '955 patent at 4:49–51.)

b. Argument Of Defendant Honda

Honda agrees with the other Defendants that the term "solid film lubricant coating" should be given its plain and ordinary meaning. In each of the independent claims of the '955 and '919 patents, the term "solid film lubricant coating" is followed by the words "consisting of." What follows defines the composition of the "coating" and the term itself. As a result, the plain and ordinary meaning of "solid film lubricant coating" would be readily apparent to a person of ordinary skill in each claim. *See ACTV, Inc. v. Walt Disney Co.*, 346 F.3d 1082, 1088–90 (Fed. Cir. 2003) ("While certain terms may be at the center of the claim construction debate, the context of the surrounding words of the claim also must be considered . . . .").

Honda does not agree with the constructions of "solid lubricants" and "solid lubricant crystals" proposed by NISTAC and the other Defendants. In Honda's view, these alternative constructions are overly broad in light of the written description.

The specification of the '955 and '919 patents describes the "invention" as a new piston construction with a solid film lubricant comprising graphite and molybdenum disulfide only. The first sentence of the section titled, "Summary of the Invention," reads:

> In a first aspect of the invention, a new piston construction is provided with *a* ***coating of solid film lubricant (SFL) comprising graphite and molybdenum disulfide*** in a resin . . . .

(Ex. A, '955 patent at 1:55–58 (emphasis added).) However, the specification adds that the invention may also have "one or more" of three specific features, which include: "(iii) increasing

the operating temperature of the solid film lubricant by combining boron nitride and molybdenum disulfide in selected proportions." (*Id.* at 1:58–68.) Accordingly, there is no genuine dispute between the parties that boron nitride is an optional "solid lubricant" for practicing the invention.

To be clear, however, the specification of the '955 and '919 patents does not mention any "solid lubricants" other than graphite, molybdenum disulfide, and boron nitride. In fact, the specification expressly defines the "invention" as having only those three lubricants.

The patents state that "this invention" includes the "novel solid film lubricant 44" shown in Figure 8 (*id.* at 4:3–6), and then with reference to the same Figure, the specification defines the "solid lubricants" of the "invention" to be graphite, molybdenum disulfide, and boron nitride:

> The coating consists of ***solid lubricants 45 (graphite, MoS_2, BN)*** and a support resin 46. The solid lubricant ingredients are operably present as a percentage of the total lubricant in the amount of about 25–58% for each of graphite and molybdenum disulfide, and about 7–16% for boron nitride.

(*Id.* at 4:36–41 (emphasis added); *see also id.* at [57] (Abstract) ("A low-friction piston construction for use in an oil-fed cylinder bore with the piston skirt relieved to define lands that are coated with SFL (***graphite, MoS_2, BN***, and a special expoxy [sic] resin).") (emphasis added).)

The claims of the '955 and '919 patents must be read in view of the specification. Indeed, "[t]he specification is always highly relevant to the claim construction analysis," and it is "the single best guide to the meaning of a disputed term." *Phillips*, 415 F.3d at 1315. Where, as here, the patents describe the "invention" as having three specific "solid lubricants" (or "solid lubricant crystals")—i.e., graphite, molybdenum disulfide, and boron nitride—the written description limits the scope of the invention.

In *Honeywell Int'l, Inc. v. ITT Industries, Inc.*, 452 F.3d 1312 (Fed. Cir. 2006), the Federal Circuit was faced with the same claim construction issue. The Court ultimately construed the term "fuel injection system component" to mean "fuel filter," despite that "the ordinary meaning of the term refer[red] to any constituent part of the fuel injection system of a motor vehicle including, for example, fuel filters, fuel lines, and connectors." *Id.* at 1316 (internal quotations omitted). Faced with language in the specification that referred to the "invention" as a "fuel filter," the Court found that "[t]he public [was] entitled to take the patentee at his word and the word was the invention is a fuel filter." *Id.* at 1318. The same exact logic applies here. The public is entitled to take the patentee at its word, which was that the available "solid lubricants" and "solid lubricant crystals" for practicing the invention were graphite, molybdenum disulfide, and boron nitride alone. *See Scimed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1343 (Fed. Cir. 2001) (construing a claim term to exclude certain configurations based on the specification's repeated characterization of a "coaxial" configuration as part of the "present invention").

3. "at least at regions of piston slap"

Independent claim 18 of the '955 patent requires that "transferred coating"[3] be present "at least at regions of piston slap" on the cylinder bore wall of the reciprocating assembly.

Defendants' Proposed Construction	**NISTAC's Proposed Construction**
"at each area where the piston skirt contacts the cylinder bore wall"	No construction necessary.

Piston slap is the "angled thrust of the piston skirt against the cylinder bore" wall. (Ex. A, '955 patent at 6:61–62.) The claim language makes clear that "regions of piston slap" encompasses ***each area*** of piston slap. Moreover, the patent specification states that piston slap

[3] The parties agree that "transferred coating" should be construed as "coating from the piston skirt that adheres to the cylinder bore wall." (D.I. 65, Ex. A at 2.)

generally causes undesirable frictional interactions. (*Id.* at 6:61–7:1.) The claimed invention purports to solve this problem by transferring lubricant coating from the claimed "lands" on the piston skirt to the cylinder bore wall, allegedly reducing the undesirable frictional interactions. (*Id.* at 7:25–31.) Thus, in order for the claimed piston to operate in the hydrodynamic lubrication regime[4] as described in the specification, the lubricant coating must transfer from the piston skirt to the cylinder bore wall wherever there is piston slap. Otherwise, the claimed piston would operate in undesirable lubrication regimes at various times during reciprocating movement.

The specification explains that the claimed piston's reduced contact area with the cylinder bore wall, caused by the creation of thin "lands" on the piston skirt, results in increased loading on the "lands." (*Id.* at 7:35–40.) This promotes the transfer of coating from the piston skirt to the bore wall. (*Id.*) As a result, within a relatively short time frame, a layer of coating forms on the wall. (*Id.* at 6:13–18.) As illustrated in the '955 and '919 patents, this transfer layer (57) is present along the entire bore wall, and thus must occur at each area of piston slap. (*See id.* Fig. 9.)

4. "asperities"

Independent claims 10 and 18 of the '955 patent and independent claims 2 and 9 of the '919 patent require the presence of "asperities" in the "lands" of the piston skirt.

Defendants' Proposed Construction	NISTAC's Proposed Construction
"cavities formed by surface roughening"	No construction necessary. Alternative: Small irregularities, imperfections or roughness

The parties dispute two issues with respect to the construction of "asperities." First, Defendants assert that "asperities" are cavities, while NISTAC contends that the term

[4] The '955 and '919 patents describe the hydrodynamic lubrication regime as "fluid sliding past other fluid layers in a gradient pattern." (*E.g.*, Ex. A, '955 patent at 1:23–24.)

"asperities" refers to any "irregularities, imperfections, or roughness." Second, Defendants contend that "asperities" are created by a surface roughening process, while NISTAC contends that they may be any inherent feature of a surface.

First, the "asperities" claimed in the '955 and '919 patents are physical cavities roughed into the surface of the metal to be filled with solid film lubricant. Figures 10–11 of the '955 and '919 patents depict the asperities (49) as cavities:

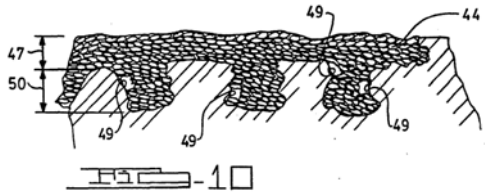


Fig-10

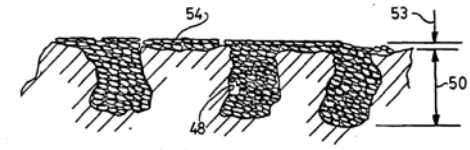


Fig-11

(Ex. A, '955 patent Figs. 10–11; *see also id.* Fig. 12; *id.* at 3:21–25 ("FIGS. 10–12 are high [sic] enlarged microsectional views of the piston land surface and coating including asperities thereof, such views showing, in sequence, the change in the coating as a result of deposition, polishing, and pocket formation.").) In fact, the patents' specification is replete with statements that define the asperities as cavities. For example, the patents define the asperities as having a "depth 50." (*Id.* at 5:33–34, 10:40–42.) Elsewhere, the patents describe the asperities as having "mouths 56." (*Id.* at 2:35–36.) Moreover, the asperities "***contain***[] SFL." (*Id.* at 7:22–23 (emphasis added).) The solid film lubricant is sprayed "***into*** the asperities," (*id.* at 5:35–37 (emphasis added)), and is entrapped "***in*** the asperities." (*Id.* at 5:65–68 (emphasis added)). Thus, "asperities," as used in the '955 and '919 patents, are cavities with a mouth and a depth, capable of containing solid film lubricants. NISTAC's construction, which portrays "asperities" as the general concept of surface roughness, is incompatible with the meaning ascribed to that term by the specification.

Second, the claimed "asperities" are created by an intentional surface roughening process. The '955 and '919 patents consistently explain that the asperities are "introduc[ed]" to

the claimed piston. (*Id.* at 2:28–29, 5:33–35; *id.* claim 10.) That is, the asperities are formed on an already-existing piston. Thus, "asperities" cannot refer to surface features that were always present on the piston surface, or that are inherent in any surface. Tellingly, the only "asperities" that are described by the patents' specification are created by surface-roughening processes—acid etching, grit blasting, or use of a hard wire brush or zinc phosphate coating. (*Id.* at 5:49–64.) In each of these processes, the underlying piston skirt wall is roughened by the formation of cavities on its surface.

NISTAC's construction of "asperities," which encompasses roughness that is not formed by a process but is rather simply an inherent or natural part of any surface, impermissibly removes the "asperities" limitation from the asserted claims. It is axiomatic that a claim element should not be eliminated from a claim through claim construction. *E.g.*, *Biocon, Inc. v. Straumann Co.*, 441 F.3d 945, 950 (Fed. Cir. 2006) ("[C]laims are interpreted with an eye toward giving effect to all terms in the claim."); *Pause Tech., LLC v. TiVo, Inc.*, 419 F.3d 1326, 1334 (Fed. Cir. 2005) ("In construing claims, however, we must give each claim term the respect that it is due."). NISTAC's construction renders the "asperities" claim limitation superfluous because ***every*** surface has some degree of imperfection.

5. "depth of the asperities"

Independent claim 18 of the '955 patent requires the "transferred coating" to have a thickness measured by the ratio of the "height of the oil film thickness"[5] to the "depth 50 of the asperities."

Defendants' Proposed Construction	NISTAC's Proposed Construction
"average of the distances from the surface of the lands to the bottom of each asperity"	No construction necessary. Plain and ordinary meaning.

[5] The parties agree that "height of the oil film thickness" should be construed as "thickness of the oil film." (D.I. 65, Ex. A at 2.)

As explained above, "asperities" are cavities, such as those depicted in Figures 10–12 of the '955 and '919 patents. Contrary to NISTAC's position, the claimed singular "depth" of the entire multitude of these asperities does not have a plain and ordinary meaning, and thus must be construed by this Court. And, as described below, given the absence of any explanation in the patents as to how to calculate the "depth of the asperities," Defendants' construction identifies the most reasonable method for determining this depth.

The '955 and '919 patents recite a single depth for the entire set of claimed asperities. The singular nature of this depth is confirmed by the fact that the patents provide for only one value of "lambda," which is defined in part by "***the*** depth of the asperities." (Ex. A, '955 patent at 2:67–68, 7:46–57 (emphasis added); *id.* claim 18 (emphasis added).) But in the real world, each asperity has a unique depth (*see id.* Figs. 10–12), and the patents do not specify how to determine "the depth of the asperities" representative of the entire set of asperities.

Defendants' proposed construction offers the only reasonable meaning for this otherwise undefined and indefinite term. The average value of the depths of the asperities takes into account all of the different asperity depths and, therefore, provides a value that is representative of the entire population of asperities. Moreover, unlike a value based on either the shallowest or deepest asperity, or the value of a single asperity, the average value of the depths of the asperities is not skewed by the depth of a single abnormally shallow or deep asperity.

The remainder of Defendants' proposed construction is uncontroversial. That is, the depth of a given asperity is the distance between the top of the asperity, which is the surface of the "land," and the bottom of the asperity. This is consistent with the specification, which describes the asperities as having a depth 50—shown in Figures 10 and 11 as the distance

between the surface of the "land" and the bottom of the asperity. (*Id.* at 5:33–35; *id.* Figs. 10–11.)

6. "microasperities"

Independent claim 18 of the '955 patent requires the "transferred coating" to possess "microasperities."

Defendants' Proposed Construction	NISTAC's Proposed Construction
"cavities significantly smaller than the asperities in the lands"	No construction necessary. Alternative: Microscopic irregularities, imperfections or roughness

NISTAC's proposal that "microasperities" need not be construed is implausible. There is no common understanding of this term, nor is the term defined in the '955 and '919 patents. In fact, the term appears only two times in the patents—one of which is in claim 18. The specification states that the transferred coating on the cylinder bore wall has "microasperities for trapping oil," (Ex. A, '955 patent at 2:65–66), and claim 18 of the '955 patent simply requires that the transferred coating has "microasperities" (*id.* claim 18).

NISTAC repeats its misguided construction of "asperities" in its alternative construction of "microasperities," simply substituting the word "microscopic" in place of the word "small." This construction, however, fails for the same reason—it does not attribute a cavity structure to the asperities, which, as explained above, is required by the '955 and '919 patents. This cavity requirement is just as applicable to "microasperities," and, in fact, the patents state that the microasperities "trap[] oil." (*Id.* at 2:65–66.)

With respect to size, the parties agree that microasperities are smaller than asperities. The parties' dispute essentially boils down to whether "microasperities" refers to "microscopic" asperities, as NISTAC contends, or whether it refers to asperities that are "significantly smaller" than the asperities in the "lands."

In common parlance, the "micro-" modifier denotes something that is significantly smaller than its average-sized counterpart. For example, the scientific usage of "micro-" refers to something that is six orders of magnitude smaller (10^{-6}) than a standard measure—a micrometer is 1/1,000,000 of a meter. As the '955 and '919 patents do not express a different meaning of the prefix "micro-," the common usage of "significantly smaller" applies here.

Moreover, NISTAC's proposal that "microasperities" are "microscopic" asperities renders the "micro-" modifier superfluous. The "asperities" of the '955 and '919 patents are themselves microscopic.[6] The claimed "microasperities" must be smaller yet.

7. "predetermined pattern"

Independent claims 10 and 18 of the '955 patent and independent claims 2 and 9 of the '919 patent require the introduction of a "predetermined pattern" of "asperities" into the "lands." Additionally, dependent claims 9 and 22 of the '955 patent require that the "solid film lubricant coating" on the "lands" has a "predetermined pattern" of grooves.

Defendants' Proposed Construction	NISTAC's Proposed Construction
"an arrangement formed by a process and determined in advance"	No construction necessary.

The '955 and '919 patents do not define the phrase "predetermined pattern." NISTAC's assertion that no construction is necessary is intended to allow NISTAC to argue that inherent surface roughness constitutes a "predetermined pattern" of asperities—even though the surface roughness follows no pattern that is predetermined. This dispute shows why the term

[6] The '955 and '919 patents define lambda as the ratio of (i) the thickness of the oil film between the piston and cylinder bore wall to (ii) the depth of the asperities. (Ex. A, '955 patent at 6:57–60; *id.* claim 18.) The patents state that the oil film thickness is approximately 20–30 microns (*see id.* at 7:40–45, 8:7–10) and require that lambda be 6 or greater to achieve a reduced coefficient of friction. (*Id.* at 6:57–60, 7:46–53; *id.* claim 18.) To achieve this lambda value in view of the disclosed oil film thickness, then, the ***asperities*** can be no larger than about 5 microns—or 0.0002 inches—deep, which is already microscopic.

"predetermined pattern" requires construction. *See O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1360 (Fed. Cir. 2008) ("When the parties raise an actual dispute regarding the proper scope of these claims, the court, not the jury, must resolve that dispute.").

The '955 and '919 patents do not ascribe a special meaning to the phrase "predetermined pattern," so its plain and ordinary meaning applies. *See Phillips*, 415 F.3d at 1314 ("In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words. In such circumstances, general purpose dictionaries may be helpful." (internal citation omitted)).

"Predetermined" denotes a decision made in advance. *See, e.g.*, *FieldTurf USA, Inc. v. Sports Constr. Group LLC*, 499 F. Supp. 2d 907, 923 (N.D. Ohio 2007) (construing "predetermined" as "according to a prior plan"). Dictionaries have a similar definition. (Ex. D, Oxford American Dictionary 702 (Oxford Univ. Press, Inc. 1980) (defining "predetermined" as "to decide in advance, to predestine.").) Thus, a "predetermined pattern" must be an arrangement that is determined in advance of its formation. Moreover, that arrangement must be formed by some process and cannot be a naturally existing feature that has always been present. Indeed, the specification explains that the asperities are actively "introduced" by acid etching, low pressure grit blasting, or the use of a hard stainless steel wire wheel. (Ex. A, '955 patent at 5:49–56.)

8. "shallow pockets"

The term "shallow pockets" appears only in claim 10 of the '955 patent and claims 2 and 9 of the '919 patent. Each claim requires the step of "forming shallow pockets at the mouth of said asperities." In addition, dependent claim 15 of the '955 patent and dependent claim 12 of the '919 patent require that "said pockets in said solid film lubricant at the mouth of said

asperities are created by brushing to remove and ***dimple the solid film lubricant at such mouths***." (Ex. A, '955 patent claim 15 (emphasis added); Ex. B, '919 patent claim 12 (emphasis added).) These dependent claims provide direct support for Defendants' proposed construction.

Defendants' Proposed Construction	NISTAC's Proposed Construction
"dimples in the coating"	No construction necessary.

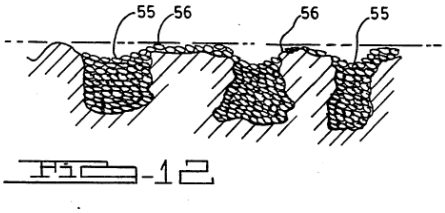
The specification of the '955 and '919 patents further supports the conclusion that the term "shallow pockets" means "dimples in the coating." The specification explains that the "shallow pockets" are formed by "brushing or other equivalent means":

> [S]hallow pockets 55 are formed at the asperity mouths 56 such as by brushing or other equivalent means (see FIG. 12).

(Ex. A, '955 patent at 5:43–45.) Importantly, the specification states that the brushing (or equivalent) creates a "dimpling effect" in the coating that creates oil pockets:

> ***The pockets 55 are formed*** in the mouth areas 56 of the coating asperities ***by steel wire brushing or equivalent to achieve the dimpling effect and thus create oil pockets***, comparable to having separate grooving. The wire brushing is effective because it removes the softer coating at the polished surface.

(*Id.* at 6:33–38 (emphasis added).) The "pockets" are shown below in Figure 12, labeled "55."



(*Id.* Fig. 12.) Additionally, the specification explains that after the solid film lubricant coating is applied to the piston skirt, the coating is then "***dimpled*** to create pockets for oil film replenishment." (*Id.* at 4:6–9 (emphasis added).) The specification then confirms that the coating is "dimpled, such as by brushing, to provide oil pockets to replenish the attracted oil film." (*Id.* at 7:24–25.)

NISTAC's position that the Court need not construe the term "shallow pockets" is untenable. For support, NISTAC points only to Figure 12 of the patents and a technical standard that (i) postdates the '955 and '919 patents by 17 years and (ii) makes no sense when viewed within the context of the patents. (D.I. 65, Ex. A at 21.) NISTAC's reliance on Figure 12 alone conveniently ignores the overwhelming intrinsic evidence cited above regarding the meaning of "shallow pockets." The term "shallow pockets" must be viewed in light of the entire specification.

Moreover, NISTAC's reliance on extrinsic evidence is improper. As an initial matter, NISTAC's suggestion that the Court turn to extrinsic evidence contradicts NISTAC's view that the term "shallow pockets" need not be construed at all. Additionally, the extrinsic evidence cited by NISTAC is dated more than 17 years ***after*** the issuance of the '955 and '919 patents. Such post-issuance evidence should not be considered during claim construction to determine the meaning of a disputed term in the patent claims ***at the time of the invention***. *See Brookhill-Wilk 1, LLC v. Intuitive Surgical, Inc.*, 334 F.3d 1294, 1299 (Fed. Cir. 2003) (declining to consider evidence dated 7 and 10 years after the alleged invention of the patent-in-suit for purposes of claim construction).[7]

Accordingly, for the reasons set forth above, the Court should construe the term "shallow pockets" to mean "dimples in the coating."

[7] It is unclear how the evidence cited by NISTAC is even relevant. The paragraph cited by NISTAC, titled "Valve Pockets," reads in full: "A machined or cast recess ***on the piston crown*** to provide clearance to the open intake or exhaust valve." (Ex. E, SAE International Surface Vehicle Standard ¶ 3.80 (May 2010) (emphasis added).) The "shallow pockets" described in the '955 and '919 patents, however, are located on the ***piston skirt*** (as opposed to the piston crown) and have no relation whatsoever to the intake and exhaust valves. (*E.g.*, Ex. A, '955 patent claim 10.) Put simply, the extrinsic evidence cited by NISTAC provides no support for its position that the term "shallow pockets" need not be construed.

9. The Claim Terms "Low-Friction" And "Providing A Low Friction Piston" Render The '955 And '919 Patent Claims Indefinite.

Under 35 U.S.C. § 112 ¶ 2, patent claims are invalid as indefinite if they are not amenable to construction and, as such, fail to notify the public of the scope of the patentee's exclusionary rights. *Honeywell Int'l, Inc. v. Int'l Trade Comm'n*, 341 F.3d 1332, 1338 (Fed. Cir. 2003). Terms that fail to set forth the bounds of the claims are indefinite as "insolubly ambiguous." *Halliburton Energy Servs., Inc. v. M-I LLC*, 514 F.3d 1244, 1249 (Fed. Cir. 2008).

The term "low-friction piston"—recited in all claims of the '955 and '919 patents—is indefinite because the patents fail to identify what falls within the scope of this relative term. The patents provide no disclosure or information as to the baseline level of friction to which a piston is compared to determine if it is "low-friction." What is a normal, average, or typical friction piston? How much lower is the friction in a "low-friction" piston? How is the "friction" of a piston determined? Under what conditions? There is no such disclosure in the specification of the '955 and '919 patents. Notably, the specification of the patents does describe several factors which influence the friction on a piston. (*See, e.g.*, Ex. A, '955 patent at 1:23–30 (piston structure); *id.* at 1:37–43 (piston coating); *id.* at 1:43–45 (engine speed).) The specification also identifies three lubrication regimes in which a piston may operate: the boundary, mixed, and hydrodynamic lubrication regimes. (*Id.* at 1:33–35.) Yet again, however, there is no indication of the regime in which the piston in question—or the baseline piston—is operating. Because the patents do not notify the public of what constitutes a "low-friction" piston within the scope of the claims, the claims are indefinite.

Tellingly, NISTAC offers no construction for this term. NISTAC baldly states that it is "not indefinite," but does not even attempt to proffer a construction. This is not surprising, as the

patents provide no disclosure that would allow one of skill in the art to determine if a particular piston is a "low-friction" piston. The term is insolubly ambiguous and, thus, indefinite.

B. The '637 Patent

1. "depositable"

The preamble of every independent claim of the '637 patent recites an "anti-friction coating composition" that is "depositable." In this case, the preambles are a limitation on the claims because they breathe life and meaning into the claims and properly define the scope of the alleged invention. *See Gen. Elec. Co. v. Nintendo Co., Ltd.*, 179 F.3d 1350, 1361–62 (Fed. Cir. 1999); *In re Paulsen*, 30 F.3d 1475, 1479 (Fed. Cir. 1994); *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1257 (Fed. Cir. 1989). Notably, during prosecution of the '637 patent, the examiner recognized that the preamble of the claims defines the scope of the alleged invention. (Ex. F, Mar. 30, 1995 Office Action at 2.) The '637 patent's claims, specification, and file history all make clear that the term "depositable" places a key limitation on the state of the claimed composition. An analogy to this concept is paint—paint in a can is "depositable" but dried paint on a wall is not. Defendants' construction properly clarifies that the claimed "depositable" composition exists ***during*** its application to a surface, not after the coating has been deposited, cured, and hardened.

Defendants' Proposed Construction	**NISTAC's Proposed Construction**
"able to be applied to a surface in its present form"	No construction necessary Alternative: "capable of being deposited"

The claims themselves support Defendants' proposed construction. ***First***, because "depositable" modifies "composition" (Ex. C, '637 patent claims 1, 7, 13, 20) and ends in "-able," the claimed composition—in its present form as spelled out in the claims—is in a state that allows it to be deposited. If it were drafted in the past tense, the claim would be directed at a film that has been "deposited." That is not the case here. ***Second***, the composition contains

either an "evaporative medium" or a "water medium" (*id.*) intended to evaporate after application. (*See infra* § III.B.3.) The composition is thus in a form that is depositable, and that form may change into some other form upon evaporation (e.g., dry paint on a wall). ***Third***, the "evaporative medium" and "water medium" are "for carrying said mixture . . . ***during deposition***." (Ex. C, '637 patent claims 1–20. (emphasis added).) This limitation further clarifies that the claimed composition is in a state that allows it to be "depositable."[8]

The specification likewise supports Defendants' construction. The specification states repeatedly that a component of the composition will evaporate after application. (*Id.* at 2:24–32 ("evaporative medium"); *id.* at 3:12–16 (describing application including use of a solvent that is then removed); *id.* at 4:49–50 ("evaporative medium").) The composition starts as a liquid (*id.* at 2:13–19 ("a liquid . . . or as a paste"); *id.* at 4:39–40 ("a liquid or semi-liquid composition of matter")), but after deposition, takes the form of a solid lubricant in which the evaporative medium is no longer present. (*Id.* at 1:13–18, 2:41–53.) The claimed "depositable" composition refers to the composition before it changes phase to a solid film lubricant.

Further, in the specification, the process of depositing the composition is referred to as "***applying***" it to the surface. (*Id.* at 4:22–28, 10:62–67 (stating that composition "is applied" to the surface); *id.* at 3:7–9 (noting that the composition is used on a surface).) For example, as depicted in Figure 14, the depositable composition is sprayed by a spray nozzle (40) to form a sprayed coating (A) on the cylinder bore wall:

[8] The claims also support the "to a surface" portion of Defendants' construction. The composition is "depositable in a thin film" as a "coating."

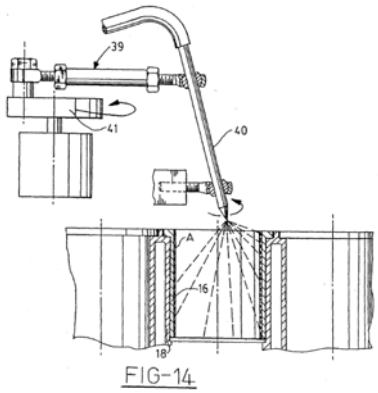


FIG-14

(*Id.* Fig. 14.) Indeed, the specification describes only three manners of applying the coating: spraying, painting by brush or roller transfer, and applying coated tape. (*Id*. at 11:10–12:56.) These three disclosed application techniques evince that the composition is a liquid that is in a form suitable for application to a surface. In contrast, the solid film lubricant coating, once deposited and solid, is not "depositable"—rather, it has already been "deposited."

Additionally, the parent patent of the '637 patent further supports Defendants' construction. The '637 patent is a child of U.S. Patent No. 5,363,821 ("the '821 patent"), which claims the deposited coating—i.e. the coating after it has been applied and the medium has evaporated. (Ex. G, '821 patent claims 1, 10.) Notably, neither the deposited coating described in the specification of the '821 patent nor the claims of the '821 patent refer to or recite the evaporative medium. Thus, the '821 parent patent is directed to the "deposited" coating ***after*** it is applied; in contrast, the '637 child patent—which is asserted in this case—is directed to the "depositable" coating ***before*** it is applied. NISTAC has only asserted the "depositable" patent—the '637 patent—in this case. If NISTAC wants to pursue ***deposited*** coatings, it has asserted the wrong patent.

2. "catalyst"

Independent claims 1, 7, and 13 of the '637 patent require a "catalyst."

Defendants' Proposed Construction	**NISTAC's Proposed Construction**
"a substance that accelerates setting of the resin without being consumed"	No construction necessary Alternative: "a substance that stimulates a reaction or a charge [sic]"

The intrinsic evidence is clear—***and the parties agree***—that a "catalyst" must be "a substance." This is consistent with the intrinsic evidence. Both the specification and the claims of the '637 patent repeatedly indicate that a "catalyst" is part of the "mixture" that is carried in an "evaporative medium."[9] (Ex. C, '637 patent at [57] (abstract), 2:24–31; *id.* claims 1–19.) Continuing the paint analogy, the catalyst must be an ingredient contained in the can of paint.

The purpose of the claimed catalyst is to "set[]" the resin, i.e., to polymerize it to a hardened state. (*Id.* at [57] (abstract), 2:28–31, 4:66–5:1; *id.* claims 1–19.) Thus, the intrinsic evidence is consistent with Defendants' construction that a "catalyst" is "a substance that accelerates setting of the resin."

The '637 patent does not ascribe a special meaning to the term "catalyst," so its plain and ordinary meaning applies and must be identified. *Phillips*, 415 F.3d at 1313–14. The overwhelming extrinsic evidence and the common chemical understanding of "catalyst" further support Defendants' construction. Notably, Courts have construed the term "catalyst" consistently with, and in fact nearly identically to, Defendants' proposed construction. (*E.g.*, Ex. H, *DuPont Air Prods. Nanomaterials, LLC v. Cabot Microelectronics Corp.*, No. CV 06-2952-PHX-ROS, slip op. at 12 (D. Ariz. Aug. 11, 2008) (construing "catalyst" as "[a] substance

[9] Other constituent elements of that "mixture" include "solid lubricant particles," "a thermoset resin," and "a crosslinking agent." Notably, the parties agree that "crosslinking agent" should be construed as "***a substance*** that bonds to form a link between two polymer chains." (D.I. 65, Ex. A at 1 (emphasis added).) In fact, the "catalyst" must be present in specified amounts "by weight," a characteristic not possible if the catalyst is not a substance. (Ex. C, '637 patent at 5:27–28, 5:37–38; *id.* claim 15.) Moreover, two specific substances, 2-propoxyethanol and ancamine, are repeatedly identified in the '637 patent specification as examples of the claimed "catalyst." (*Id.* at 4:66–5:1, 5:27–28, 5:37–38; *id.* claims 10, 12, 15.)

that increases the rate of a chemical reaction without being consumed or undergoing a chemical change"). Moreover, dictionaries are also consistent with Defendants' proposed construction. (Ex. I, The American Heritage Dictionary 219–20 (3d ed. 2000) (defining a "catalyst" as "[a] substance that modifies and increases the rate of a reaction ***without being consumed in the process***" (emphasis added)); Ex. J, Academic Press Dictionary of Science and Technology 374 (Christopher Morris ed., 1992) (defining "catalyst" as "any substance that notably affects the rate of a chemical reaction ***without itself being consumed*** or essentially altered" (emphasis added)); Ex. K, Hawley's Condensed Chemical Dictionary 231 (11 ed. 1987) (defining "catalyst" as "[a]ny substance of which a fractional percentage notably affects the rate of a chemical reaction ***without itself being consumed*** or undergoing a chemical change" (emphasis added)); *see* Ex. L, MacMillian Dictionary of Materials and Manufacturing 63 (The MacMillian Press Ltd. 1990); Ex. D, Oxford American Dictionary 130 (Oxford Univ. Press, Inc. 1980).)

Indeed, even the extrinsic evidence NISTAC identified supports Defendants' construction. (Ex. M, McGraw-Hill Dictionary of Science and Engineering 146 (Sybil P. Parker ed. 1984) (defining "catalyst" as "[s]ubstance that alters the velocity of a chemical reaction and ***may be recovered essentially unaltered in form and amount*** at the end of the reaction" (emphasis added)); Ex. N, The Condensed Chemical Dictionary 205 (Gessner G. Hawley, 10th ed. 1981) (defining "catalyst" as "[a]ny substance of which a fractional percentage notably affects the rate of a chemical reaction ***without itself being consumed*** or undergoing a chemical change" (emphasis added)).) Thus, consistent with the intrinsic evidence and the extrinsic evidence identified by every party, "catalyst" must be construed in accordance with its ordinary meaning, "a substance that accelerates setting of the resin without being consumed."

3. "evaporative medium for carrying said mixture during deposition"

Independent claims 1, 7, and 20 recite a "mixture" and an "evaporative medium for carrying said mixture during deposition." (Ex. C, '637 patent claims 1–20.) The mixture requires specific substances to be present—"solid lubricants," a "resin," and in some claims, a "crosslinking agent" and/or a "catalyst"—while the "medium" carries the mixture in suspension during deposition. (*Id.*)

Defendants' Proposed Construction	NISTAC's Proposed Construction
"liquid that facilitates application of a mixture and then evaporates"	No construction necessary Alternative: "A substance that is capable of being evaporated and can carry a mixture during deposition"

The claim term itself supports Defendants' proposed construction. ***First***, because the term contains the phrase "evaporative medium," it must be a liquid because liquids—not solids—evaporate. ***Second***, the evaporation must occur ***after deposition*** because the evaporative medium will still be carrying the mixture ***during*** deposition, and it must be a liquid rather than a gas to do so; thus, the phrase "and then evaporates" in Defendants' construction denotes the proper chronology.

The patent describes the evaporative medium as being a liquid that carries the mixture during the deposition process, thus "facilitat[ing] application of a mixture" in accordance with Defendants' construction. As described in the specification, the evaporative medium is either a solvent (the patent lists several possible solvents) or water acting as a suspension carrier. (*Id.* at 2:32–34, 3:1–2, 5:6–13.) Solvents and water are both liquids. A solvent dissolves another substance (e.g., a resin). (*E.g.*, *id.* claim 4.) The depositable composition claimed in the '637 patent is applied to the surface and, as a solution or as a suspension, carries the mixture with it.

Following the application process, the evaporative medium that carried the mixture "then evaporates." An evaporative medium, by its nature, evaporates. Moreover, the specific

evaporative mediums listed in the specification—water and several solvents—are liquids that evaporate. (*Id.* at 5:6–13.) Finally, the patent describes the coated piston as not having any evaporative medium after the manufacturing process is complete. (*Cf. id.* at 2:41–53 (describing system for protecting a metal surface from wear in which the evaporative medium is ***no longer present***); *id.* at 4:52–53 (measuring solid lubricants as a proportion of what is left over ***after evaporation***).)

NISTAC's proposed construction does not acknowledge that the evaporative medium must be a liquid, thereby eliminating the required chronology. NISTAC's selection of the words "capable" and "can" is not supported by the intrinsic evidence and ignores the fact that the claims are directed to compositions containing an evaporative medium present ***before*** deposition, specifically to assist in the coating process. Thus, Defendants' construction—which comports with the intrinsic record—should be adopted.

4. "solid lubricant crystals"

Each independent claim of the '637 patent requires the "mixture" to contain "solid lubricant crystals."

Defendants' Proposed Construction	**NISTAC's Proposed Construction**
"crystals of two or more solid lubricants, all crystals being oil attracting"	"Crystals with lubricating properties and in solid film form with at least two crystals chosen from the group of graphite, boron nitride (BN), and molybdenum disulfide (MoS_2), regardless of the existence of other crystals with lubricating properties"

The claim term "solid lubricant crystals" is plural, plainly indicating that it requires multiple crystals of solid lubricants. Like the '955 and '919 patents, the '637 patent specification indicates that "solid lubricants" refer to two or more solid lubricants. Indeed, the '637 patent specification rejects using a single solid lubricant because it will not achieve the claimed objectives of reducing the coefficient of friction. (Ex. C, '637 patent at 5:42–48.) Moreover, the

'637 patent is more restrictive than the '955 and '919 patents because the "solid lubricants" described in the '637 patent must also be oil attracting. The '637 patent discloses a ***specific*** composition that is both oil attracting and capable of supporting large loads at high temperatures, and specifically identifies lubricants that meet these criteria. (*Id.* at [57] (abstract), 2:41–53, 5:48–6:6, 7:13–45.) Indeed, the specification affirmatively teaches away from materials that are oil phobic and, therefore, fail to meet these criteria:

> A number of solid lubricants, ***which lack the characteristics needed for this invention***, are as follows: Teflon, unalloyed and stress passivated nickel, copper, and iron all are ***oil phobic***, and other solid lubricants such as PTFE (Teflon) filled coatings or PTFE itself, WS_2 (tungsten disulfide), are not load supporting for hydrodynamic lubrication mode nor have the necessary temperature stability at temperatures 600°–700° F.

(*Id.* at 8:6–13 (emphasis added).) By describing this particular composition, and specifically teaching away from any oil phobic material, the applicants disavowed materials—such as those enumerated in the specification—that do not attract oil. *E.g.*, *Honeywell*, 452 F.3d at 1319 ("Nevertheless, based on the disclosure in the written description, which demeaned the properties of carbon fibers, we conclude that the patentee thereby disavowed carbon fibers from the scope of the [patent-in-suit's] claims.").)

NISTAC's proposed construction suffers from many of the same defects as its proposed construction for the "solid lubricant"–related terms in the '955 and '919 patents. (*See infra* § III.A.2.) NISTAC improperly imports limitations not present in the claims, best shown by the fact that NISTAC attempts to supplant a simple three-word phrase with a construction containing more than ***twelve times*** as many words. In addition to importing numerous limitations, such a construction will only confuse—not aid—a jury's resolution of this case.

5. "ratio"

Claims 1, 6, and 19 of the '637 patent recite a specific "ratio" of evaporative medium to the mixture containing solid lubricant crystals and resin. Independent claim 7 of the '637 patent recites a specific "ratio" of evaporative medium to the thermoset resin.

Defendants' Proposed Construction	**NISTAC's Proposed Construction**
"ratio by weight"	No construction necessary

As noted above, the composition described in the '637 patent includes a "mixture" and a "medium." The specification of the '637 patent explains the relationship between the amount of "mixture" (i.e., solid lubricant crystals and resin) and the amount of evaporative medium in the claimed composition by the weight of each component. Specifically, the specification provides that "[w]hen preparing a composition using a solvent medium, the best mode comprises a solid lubricant mixture (***in weight % of the composition***) . . . ." (Ex. C, '637 patent at 5:22–25 (emphasis added).) The specification further provides that "[w]hen preparing a composition using a water suspension, the best mode comprises a solid lubricant mixture (***in weight % of the composition***) . . . ." (*Id.* at 5:31–33 (emphasis added).) The '637 patent only contemplates the amount of various compounds in the claimed composition as a ratio by weight. It does not even mention—let alone describe—a ratio measured by liquid volume, molar volume, or any other metric. Accordingly, "ratio by weight" is the only construction that is plausible in view of the intrinsic evidence.

NISTAC's proposal that this term needs no construction and should be given its plain and ordinary meaning is contrary to the disclosure in the specification. The '637 patent only describes the ratio between the evaporative medium and the solid lubricant/resin mixture in terms of the ***weight*** of each component.

6. "polymerizable" / "polymerization" / "polymerizes"

Claims 3 and 20 of the '637 patent require the thermoset resin to be "polymerizable," and claim 7 requires a catalyst and a crosslinking agent for the "polymerization" of the resin and a thermoset resin that "polymerizes" to an infusible state. These terms are used in the '637 patent claims to describe the hardening of the thermoset resin.

Defendants' Proposed Construction	NISTAC's Proposed Construction
"capable of being hardened" / "hardening" / "hardens"	No construction necessary Alternative: "Capable of being reacted to form a long molecular chain or macromolecule" / "process of reacting a chemical to form a long molecular chain or macromolecule" / "reacting a chemical to form a long molecular chain or macromolecule"

The '637 patent specification describes a mixture containing solid lubricant crystals and a thermoset resin in "a liquid or semi-liquid composition . . . that can be easily deposited . . . ." (Ex. C, '637 patent at 4:39–41.) Once the mixture is deposited, the patent notes that the uncured resin is polymerized to "provide a stable coating." (*Id.* at 3:28–30.) The '637 patent specification uses the terms "polymerize," "set," and "cure" interchangeably to describe the hardening of the resin. (*See id.* at 4:44–48 ("The composition is comprised of . . . a thermoset resin, a catalyst for ***setting the resin*** . . . ." (emphasis added)); *id.* at 4:57–60 ("The thermoset resin . . . [has] a tendency ***to flow*** on stress ***before being polymerized***." (emphasis added)); *id.* at 8:39–40 ("[T]he polymer also should ***contain a curing agent*** . . . ." (emphasis added)).) Accordingly, the terms "polymerizable," "polymerization," and "polymerizes" should be construed to mean "capable of being hardened," "hardening," and "hardens," respectively.

NISTAC offers a complicated, highly technical construction that is not supported by the specification of the '637 patent and ultimately will not be helpful to a jury. To define a single word, the plaintiff offers a long construction that uses words such as "macromolecule" and "long

molecular chain." These words have no clear meaning and no support in the '637 patent—these terms are not even used in the specification, let alone explained by NISTAC. In fact, the '637 patent contains no discussion whatsoever about the chemistry of, or the chemical bonding involved in, the polymerization of a resin. Tellingly, NISTAC relies solely on extrinsic evidence to support its convoluted construction. NISTAC's highly technical, unsupported, and ultimately unhelpful construction should be rejected.

7. "polymerizing agents"

The term "polymerizing agents" is found only in claim 20 of the '637 patent.

Defendants' Proposed Construction	**NISTAC's Proposed Construction**
"two or more catalysts or crosslinking agents"	No construction necessary. Plain and ordinary meaning.

Because this term is used in a plural form, it must be construed as meaning more than one polymerizing agent. According to claim 20, the "polymerizing agents" are used to set (i.e., harden) the thermoset resin. (Ex. C, '637 patent claim 20.) The '637 patent discloses only two substances for setting (i.e., hardening) the resin: a catalyst and a crosslinking agent. Specifically, the '637 patent provides, "[t]he invention . . . compri[ses] . . . a catalyst for setting the resin (sometimes a crosslinking agent for polymerization of the resin)." (*Id.* at 2:24–31; *see also id.* at 5:26–29 ("[T]he catalyst is 2-propoxyethanol in an amount such as 0.5%. The cross-linking agent is dicyandiamide in an amount of about 1–3%.").) Therefore, the term "polymerizing agents" should be construed as "two or more catalysts or crosslinking agents."

NISTAC ignores the fact that this term lacks a plain and ordinary meaning. A construction of this term is necessary because (1) it is not a well-known or well-understood term, and (2) it does not appear anywhere in the patent other than in claim 20. Because the patent only discloses two substances for setting the resin, construing this term as "two or more catalysts or crosslinking agents" will assure that this term is given its proper scope and will assist the jury.

8. The Claim Phrases "Coefficient Of Friction" And "Provide A Coefficient Of Friction" Render The '637 Patent Claims Indefinite.

The phrases "coefficient of friction" and "provide a coefficient of friction" appear in every claim of the '637 patent. Each claim provides a ***specific numeric value*** for the "coefficient of friction."[10] The patent, however, provides no disclosure as to how, when, or under what conditions the coefficient of friction is measured. Yet the patent ***concedes*** that the coefficient of friction varies greatly based upon a number of variables, including temperature. (Ex. C, '637 patent at 6:58–60.) Moreover, the patent fails to specify whether the claimed coefficient of friction value refers to ***static*** or ***dynamic*** coefficient of friction. (*See, e.g.*, Ex. O, Webster's Third New International Dictionary 438 (2002); Ex. P, Lindeburg, Engineer In Training Review Manual 9–16 (6th ed. 1982.) As such, a person of ordinary skill could not discern the boundaries of the claims of the '637 patent, rendering them insolubly ambiguous and thus invalid. *Halliburton*, 514 F.3d at 1249; *Honeywell*, 341 F.3d at 1338–39.

The specification of the '637 patent concedes the ***significant*** effect of temperature and other variables on the coefficient of friction, but it is devoid of any discussion as to the temperature at which—or the conditions under which—the coefficient of friction is to be measured. Specifically, the specification of the '637 patent states that "[f]riction is also ***influenced significantly by temperature*** because high local temperatures can influence adhesion at the contact points." (Ex. C, '637 patent at 6:58–60 (emphasis added).) As an example, the specification illustrates the effect of temperature on a block of graphite:

[10] Claims 1, 7 and 20 recite a "coefficient of friction of 0.06 or less," while claim 13 recites a "coefficient [of friction] of 0.04 or less." Claim 13 of the '637 patent contains the term "provide a coefficient," omitting the words "of friction." For purposes of this analysis, the coefficient recited in claim 13 is deemed to refer to a coefficient of friction. Defendants, however, do not waive any arguments that the term "provide a coefficient" in claim 13 is indefinite.

> The coefficient for block graphite ***rapidly increases*** to above 0.4 at 500° F. and above 0.5 at 800° F., and even higher at 1000° F. The coefficient of friction for graphite at 400° F. or lower becomes generally uniform at below 0.05.

(*Id.* at 7:2–6) (emphasis added.) The specification discloses numerous other variables that affect the coefficient of friction:

> Friction is influenced by the attraction of the two surfaces, the deformation and tearing of surface irregularities, hardness of the interengaged surfaces, and the presence of surface films such as oxides or oils. As a result, actual friction will be different from idealized perfect contact friction, and will depend upon the ratio between shear and yield stresses of the interengaged surfaces. Thus, the presence of a film 16 on each of the interengaging surfaces 17, 18 (see FIG. 5) will serve to change the coefficient of friction depending upon the shear and yield stress capacities of the films and their relative hardness.

(*Id.* at 6:43–54.) Moreover, the specification of the '637 patent concedes that even if the alleged invention is used, the coefficient of friction would not be lower than 0.06 (or 0.04)—as all claims require—at every temperature. For example, the specification concedes:

> Contrast this with the coefficient of friction performance and wear performance of ***the coating system of this invention*** represented in FIG. 9. You will note that the coefficient of friction generally uniformly stays ***below 0.1***, and wear is generally uniform at about 0.001"/100 hours at 500° F., in FIG. 9.

(*Id.* at 7:6–11 (emphasis added).) Notably, the specification provides no description of the method for testing to determine the coefficient of friction, nor any detail regarding the procedure used to gather the data represented in Figure 9.

The present case is analogous to *Honeywell*. There, the patent claims all required a yarn with a specific numeric range of a "melting point elevation" ("MPE"). *Honeywell*, 341 F.3d at 1335–36. The patent disclosed a testing method for MPE but did not describe what method had to be used to prepare a yarn specimen for the test, even though different preparation methods resulted in great variance in the calculated MPE. *Id.* at 1336. The Federal Circuit affirmed a finding of indefiniteness. *Id.* at 1342. Here, the '637 patent discloses ***even less*** than the patent

ruled invalid in *Honeywell*—the '637 patent does not even disclose a method for determining coefficient of friction, let alone a method for preparing a sample for such a test.

Again, NISTAC's failure to provide a construction for these terms is telling. NISTAC had its chance to assert that these terms are amenable to construction, but its lack of a proposal is indicative of the insolubly ambiguous nature of these terms. One of ordinary skill cannot discern the boundaries of the claims containing the terms "coefficient of friction" and "provide a coefficient of friction." Which coefficient—static or dynamic—should be measured? At what temperature is the coefficient to be measured? And at what load? And under what conditions? And how is it to be measured? *See, e.g.*, *Halliburton*, 514 F.3d at 1249; *Dura Global Techs., Inc. v. Magna Donnelly Corp.*, No. 07-CV-10945-SFC-MKM, 2010 WL 4259615, at *22 (E.D. Mich. Oct. 25, 2010). Without answers to these questions, the claims are indefinite.

9. The Claim Term "Deposited Coating" Renders Claim 3 Of The '637 Patent Indefinite.

The term "deposited coating" is found in claim 3 of the '637 patent, which depends from claim 1. While claim 1 refers only to a "depositable" coating, claim 3 refers to "the ***deposited*** coating." (Ex. C, '637 patent claim 3 (emphasis added).) Because the dependent nature of claim 3 means that it inherits all limitations of claim 1, the two concepts cannot be reconciled—the coating in claim 3 cannot be both "depositable" and "deposited" at the same time. This renders the claim insolubly ambiguous and, therefore, invalid.[11]

IV. CONCLUSION

For the foregoing reasons, Defendants respectfully request that this Court adopt Defendants' proposed constructions as set forth above.

[11] NISTAC did not proffer a construction for this term, instead simply asserting that it is "not indefinite." The irreconcilable conflict in the intrinsic evidence, however, dictates otherwise.

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Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that a copy of DEFENDANTS' INITIAL CLAIM CONSTRUCTION BRIEF was filed electronically and thus served on all counsel of record on this 4th day of November, 2011.

/s/ Paul T. O'Neill

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